

## **DETAILED ACTION**

### ***Information Disclosure Statement***

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Specification***

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Figure 2D is not explained in the specification. Other figures should be denoted by e.g. 17A, 17b, 17C, not 17, 17A, 17B, which causes confusion in the reader.

*37 CFR 1.74 Reference to drawings.*

When there are drawings, there shall be a brief description of the several views of the drawings and the detailed description of the invention shall refer to the different views by specifying the numbers of the figures, and to the different parts by use of reference letters or numerals (preferably the latter).

The applicants Brief Description of the Drawings does not provide a list and corresponding brief description of the figures referenced. MPEP 608.01 (f).

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 112-first paragraph***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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Claims 13-15, 34-39 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The manufacture of the probe with an edge smaller than a DNA nucleobase is critical or essential to the practice of the invention, but not included in the claim(s) and is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). After reading the specification, the examiner is still confused as to how to make the claimed probe device, specifically the shape to be that specific shape, without burdening the average person of skill in the art with undue experimentation.

***Claim Rejections - 35 USC § 112-second paragraph***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites the limitation "said objects" in line 3 and line 4. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 13 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Takazawa (6930307).

**Regarding Claim 13**, Takazawa teaches the probe for analyzing an extended object, the extended object having plural sub-objects (Figure 4, part 30, 2 steps are sub objects), the probe comprising a body having an edge, the edge having a thickness less than a relevant dimension of one of

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said sub-objects (nanometer diameter less than clearly larger steps of Figure 4), and a length substantially greater than a relevant dimension of one of said sub-objects (nanotube 22 longer than step height).

**Regarding Claim 15**, Takazawa teaches the probe for analyzing an object, the probe comprising a body having an analyzing region (Figure 4, part 24), the analyzing region having a dimension less than a relevant dimension of one (or more) of said objects (part 10 smaller than area taken up by a step) and a width substantially greater than a relevant dimension of one of said objects (Figure 4, part 10 diameter is bigger than the step height).

**35 and 43.** Takazawa teaches a probe as in claim 13/15, wherein said body is formed of a single layer or a predictable number of layers derived from a lamellar material (Figure 1a,1b).

**36 and 44.** Takazawa teaches a probe as in claim 35/43, wherein the lamellar material is selected from the group consisting of super lattices, MoS<sub>2</sub>, NbSe<sub>2</sub>, Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>x</sub>, *graphite*, mica, boron nitride, dichalcogenides, trichalcogenides, tetrachalcogenides, pentachalcogenides and hydrotalcite-like materials (Figure 1a).

**37 and 45.** Takazawa teaches a probe as in claim 13/15, wherein said body is a single layer or a predictable number of layers of graphene (Figure 1a, 1b).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hidaka (6555362) in view of Watanabe (20020132500).

**Regarding Claim 13**, Hidaka teaches a probe for analyzing an extended object, the extended object having plural sub-objects (extended object is a RNA strand, sub objects are the bases), the probe

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comprising a body having an edge, and a length substantially greater than a relevant dimension of one of said sub-objects (length of carbon nanotube).

Hidaka fails to teach how wide the carbon nanotube is.

Watanabe teaches that carbon nanotubes can vary from .5-50 nm ([36]).

Therefore, it would have been obvious that the edge of the probe of Hidaka would have had (in an obvious embodiment) a thickness less than a relevant dimension of one of said sub-objects (diameter of carbon nanotube less than a relevant dimension of one of the bases).

**Claim 14.** Hidaka and Watanabe teach the probe as in claim 13 wherein said probe includes a material that hybridizes with at least one known sub-object of said plural sub-objects (Column 3, lines 23-39).

**Regarding Claim 15,** Hidaka teaches a probe for analyzing an object, the probe comprising a body having an analyzing region (Figure 1, 10 and 11), the analyzing region having a dimension less than a relevant dimension of one of said objects (carbon nanotube less than strand length), and a width substantially greater than a relevant dimension of one of said objects (width of metal probe known in the art to be greater than the width of an elongated single strand of RNA).

**34 and 42.** Hidaka and Watanabe teach the probe as in claim 13/15, wherein said body is formed of an electrically conductive material (Watanabe [36]).

**35 and 43.** Hidaka and Watanabe teach the probe as in claim 13/15, wherein said body is formed of a single layer or a predictable number of layers derived from a lamellar material (Watanabe [38]).

**36 and 44.** Hidaka and Watanabe teach the probe as in claim 35, wherein the lamellar material is selected from the group consisting of super lattices, MoS<sub>2</sub>, NbSe<sub>2</sub>, Bi<sub>2</sub>Sr<sub>2</sub>CaCu<sub>2</sub>O<sub>x</sub>, graphite, mica, boron nitride, dichalcogenides, trichalcogenides, tetrachalcogenides, pentachalcogenides and hydrotalcite-like materials (Watanabe [38]).

**37 and 45.** Hidaka and Watanabe teach the probe as in claim 13, wherein said body is a single layer or a predictable number of layers of grapheme (Watanabe [38]).

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**38 and 46.** Hidaka and Watanabe teach the probe as in claim 13/15, wherein the extended object to be analyzed is a biopolymer comprised of nucleobases as the sub-objects (Hidaka, Col. 3, lines 25-30).

**39 and 47.** Hidaka and Watanabe teach the probe as in claim 13/15, wherein the extended object to be analyzed is a deoxyribose nucleic acid molecule comprised of nucleobases as the sub-objects (Hidaka, Col. 6, lines 1-5).

**40 and 48.** Hidaka and Watanabe teach the probe as in claim 13/15, wherein the extended object to be analyzed is a ribose nucleic acid molecule comprised of nucleobases as the sub-objects (Hidaka, Col. 3, lines 25-30).

Claims 41 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hidaka and Watanabe as applied to claim 41 and 49 above, and further in view of Lieber et al. (6159742).

**Regarding Claims 41 and 49.** Hidaka and Watanabe teach the probe as in claim 13/15.

They fail to explicitly teach wherein the extended object to be analyzed is a polypeptide molecule comprised of amino acids as the sub-objects (Watanabe [40], mentions polypeptides).

Lieber teaches different types of functional groups attached to a nanotube (Figure 1) other than the bases taught by Hidaka.

Modification would have entailed utilizing other biological active functionality nanotube ends (Lieber, Col. 3, lines 49-55) for polypeptides.

It would have been an obvious modification to have made in order to examiner and analyze more types of substances.

Lastly, a person with ordinary skill in the art has good reason to pursue the known options (in this case, looking at other substances) within his or her technical grasp. If this leads to the anticipated success, it is likely the product is not of innovation but of ordinary skill and common sense; see **Pfizer, Inc. v. Apotex, Inc. (480 F.3d 1348, 82 USPQ2d, 1321 (Fed. Cir. 2007))**.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brooke Purinton whose telephone number is 571.270.5384. The examiner can normally be reached on Monday - Friday 7h30-5h00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571.272.2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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